



US006047846A

United States Patent [19]
Watson

[11] **Patent Number:** **6,047,846**
[45] **Date of Patent:** **Apr. 11, 2000**

[54] **PLASTIC DRUM WITH DRAIN SUMP**

[75] Inventor: **Lowell George Watson**, Belleville, Canada

[73] Assignee: **Greif Bros. Corp. of Ohio**, Delaware, Ohio

[21] Appl. No.: **09/170,209**

[22] Filed: **Oct. 13, 1998**

Related U.S. Application Data

[63] Continuation of application No. 08/107,905, Aug. 17, 1993, abandoned, which is a continuation of application No. 08/015,081, Feb. 8, 1993, abandoned, which is a continuation of application No. 07/860,202, Mar. 26, 1992, abandoned, which is a continuation of application No. 07/660,699, Feb. 25, 1991, abandoned.

[51] **Int. Cl.⁷** **B65D 21/00**
[52] **U.S. Cl.** **220/601; 220/4.04; 220/4.05**
[58] **Field of Search** **220/601, 623, 220/4.04, 4.05, 4.06; 222/372**

[56] **References Cited**

U.S. PATENT DOCUMENTS

128,051 6/1872 Manning .
1,619,492 3/1927 Spaeth 222/379
2,087,349 7/1937 Lucker 220/4.04
2,656,314 10/1953 Osterheld .
2,657,826 11/1953 Ludowitz .

3,129,730 4/1964 Simon .
3,170,586 2/1965 Bulgrim 220/4.04
3,370,737 2/1968 Ainslie .
3,952,904 4/1976 Verlinden 220/4.05
4,022,345 5/1977 Butz 220/85 K X
4,088,239 5/1978 Uhlig 220/4.05 X
4,557,406 12/1985 Olinger .
4,690,299 9/1987 Cannon .
4,779,754 10/1988 Eyck .
4,785,958 11/1988 Snyder .
4,793,491 12/1988 Wolf .
4,828,131 5/1989 Strubel 220/4.04 X
4,840,284 6/1989 Snyder .
4,927,040 5/1990 Cramer 220/601
5,184,751 2/1993 Middleton 220/601
5,199,570 4/1993 McKenzie 220/4.05 X

FOREIGN PATENT DOCUMENTS

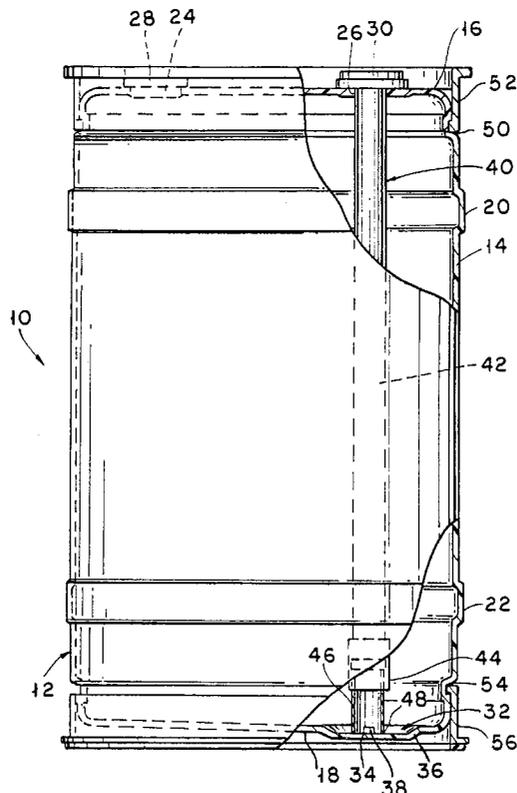
658594 7/1965 Belgium 220/4.05
379230 1/1939 Canada .

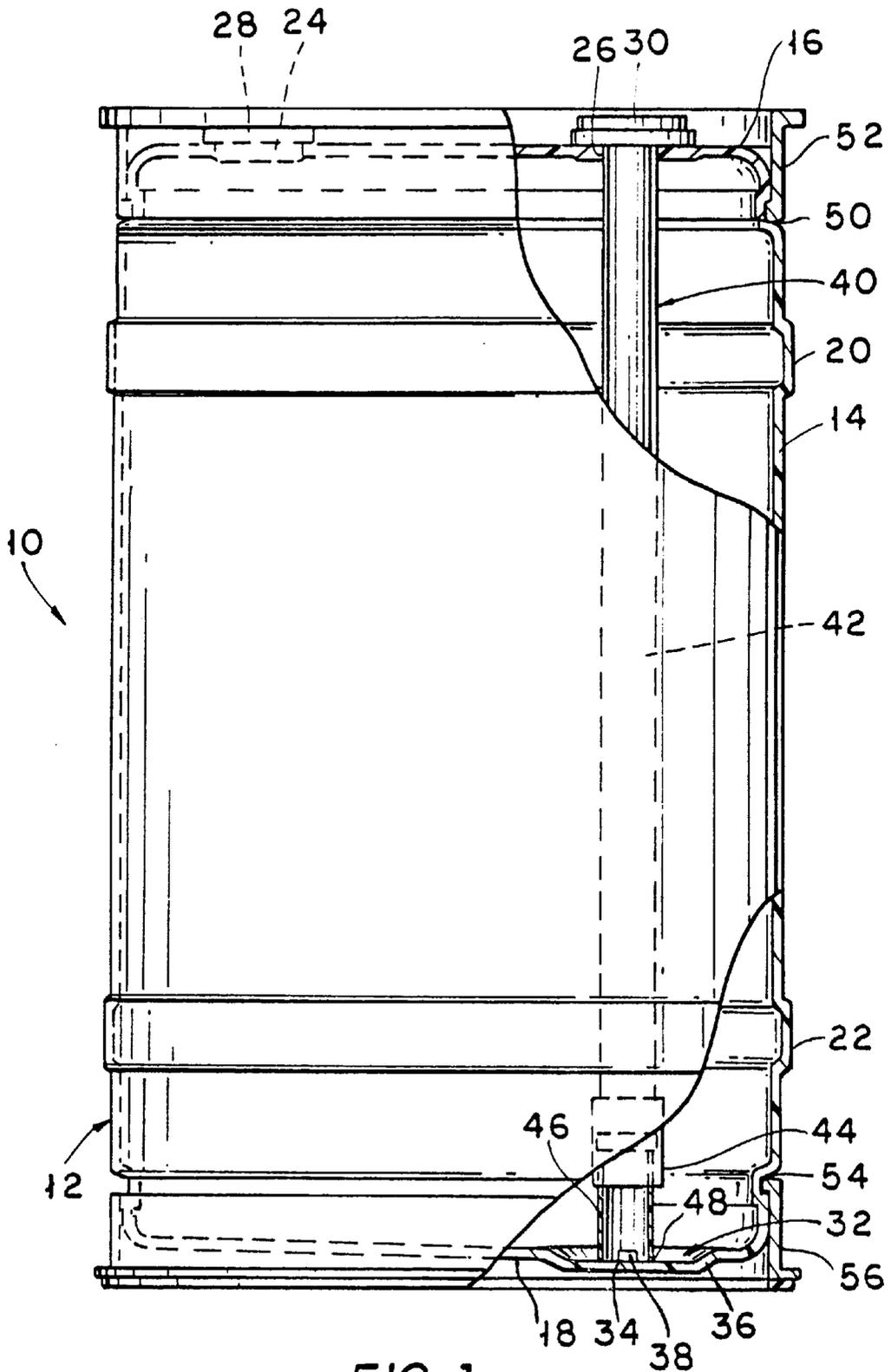
Primary Examiner—Steven Pollard
Attorney, Agent, or Firm—Vorys, Sater, Seymour and Pease LLP

ABSTRACT

A plastic drum is formed with a body having an access hole on top and protective chimes. The body also includes a sloping bottom with a sump aligned with the access hole to allow, substantially, all the contents of the drum to be removed without turning the body upside down.

24 Claims, 2 Drawing Sheets





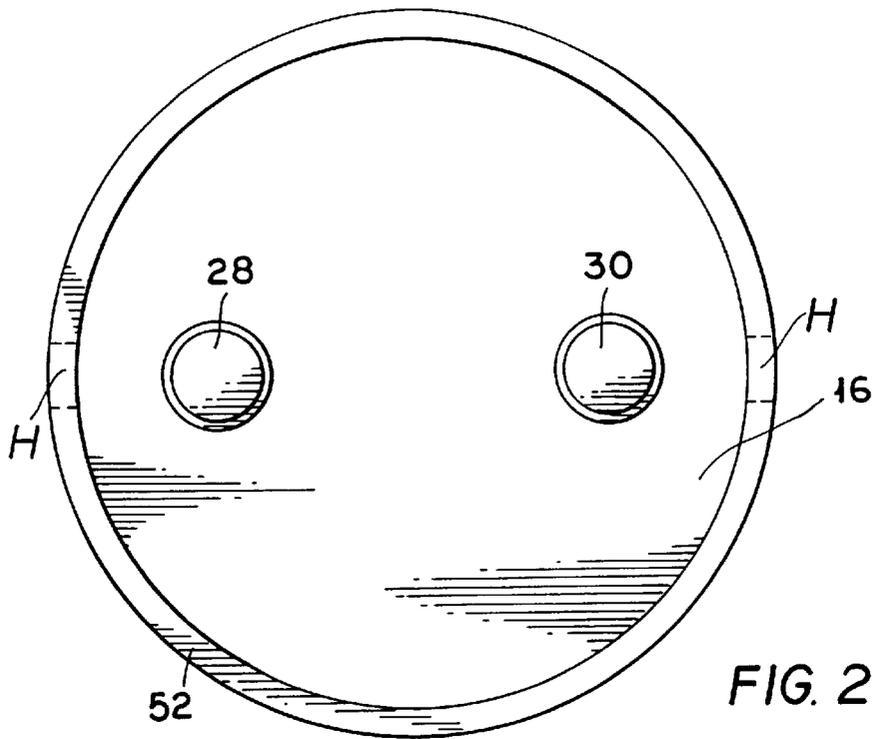


FIG. 2

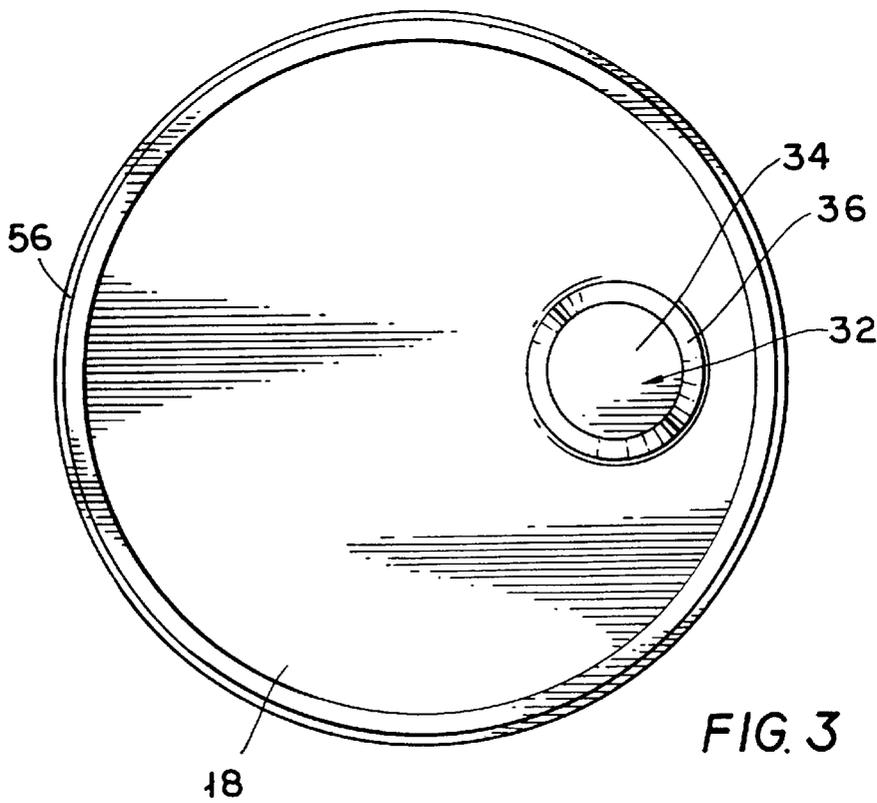


FIG. 3

PLASTIC DRUM WITH DRAIN SUMP**CROSS-REFERENCE TO RELATED APPLICATION**

This application is a continuation of application Ser. No. 08/107,905 filed Aug. 17, 1993, now abandoned which is a continuation of application Ser. No. 08/015,081 filed Feb. 8, 1993, now abandoned which is a continuation of application Ser. No. 07/860,202 filed Mar. 26, 1992 now abandoned, which is a continuation of application Ser. No. 07/660,699 filed Feb. 25, 1991, now abandoned.

BACKGROUND OF THE INVENTION**A. Field of Invention**

This invention relates to a unitary plastic drum for shipping and storing various materials, and more specifically to a plastic drum for liquid materials, which drum has a sloping bottom with a sump so that all the liquid can be pumped out efficiently.

B. Description of the Prior Art

Plastic drums are used frequently to ship and store various materials. These types of drums are preferred over metal drums because they are simpler and cheaper to make, easier to handle, and weigh less. Frequently, plastic drums are used to ship liquid materials used in agriculture, or the chemical industry which are highly concentrated and therefore, must be diluted. Since these liquids are very expensive, it is important that all the contents of the drum be removed before the drum is discarded or returned, to eliminate waste. One method of emptying completely the contents of a plastic drum would be to turn the drum upside down. However, this procedure is time-consuming and requires special equipment. Moreover, if the drum contains hazardous materials, turning the drum over may result in a spill, which is both uneconomical and undesirable.

Hence, there is a great need in the art for a plastic drum which could be emptied efficiently.

OBJECTIVES AND SUMMARY OF THE INVENTION

In view of the above-mentioned disadvantages of the prior art, it is an objective of the present invention to provide a plastic drum which can be efficiently emptied without turning it over.

Yet a further objective is to provide a plastic drum which can be made efficiently and economically for example by blow molding.

Another objective of the invention is to provide a drum which can be emptied efficiently using standard equipment.

Other objectives and advantages of the invention shall become apparent from the following description of the invention. Briefly, a plastic drum constructed in accordance with this invention consists of a substantially cylindrical plastic body having a straight side, top and a sloping bottom. At least one access hole is provided on the top for filling and emptying the drum, said hole being off-center. The bottom is formed with a sump which is vertically aligned with the access hole whereby as the drum is emptied, all the liquid collects in the sump and is easily removed. A top and a bottom chime are added to the body for protection as well as to insure that the drum stands upright or vertical when resting on a horizontal surface, and to ease handling.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows a partial elevational view of a drum constructed in accordance with this invention;

FIG. 2 shows a top view of the drum; and
FIG. 3 shows a bottom view thereof.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to the drawings, a drum **10** constructed in accordance with this invention includes a body **12** having a cylindrical sidewall **14**, a top **16** and a sloping bottom **18**. Body **12** is made of a plastic material and is formed by blow molding. Sidewall **14** is formed with a pair of circumferential ribs **20**, **22** which reinforce the body **12** and also facilitate handling the drum. Top **16** is formed with two circular access holes **24**, **26** covered by suitable closures **28**, **30**. Holes **24**, **26** are advantageously disposed away from the longitudinal axis of the drum so that it is easy to install and remove the closures, and it is easy to fill up and empty the drum.

A sloping bottom **18** is formed with a sump **32** defined by a flat area **34** joined to the rest of the bottom by a conical wall **36**. Flat area **34** is circular and has a diameter which is slightly larger than access hole **26**. Importantly, area **34** is aligned vertically and coaxially with hole **26** and, as shown in FIG. 1, defines the lowest area of bottom **18**. Disposed on surface **34** is a boss **38**. Extending between hole **26** and sump **32** is a draining pipe **40**. At its top portion, draining pipe **40** is supported by access hole **26**. Draining pipe **40** can be permanently installed within the drum, or it may be provided separately, and installed only prior to the dispensing of liquid therefrom. As shown in detail in FIG. 1, draining pipe **40** includes an upper section **42**, a sleeve **44** and a lower stub **46**. Upper section **42** and stub **46** are axially movable within the sleeve **44** to adjust the overall length of pipe **40**. In this manner the pipe **40** can be adjusted so its length matches exactly the inner height of body **12**. The stub **46** is terminated with a bottom end **48** which is provided with perforations or holes (not shown) to provide a passageway for liquid from the sump to enter into the drain pipe **40**. In this manner, the liquid from drum **10** may be dispensed for example by applying suction to pipe **40**, or by other means well known in the art. Boss **34** is used to align the bottom of pipe **40** with respect to sump **32**.

At, or near, the interface between sidewall **14** and top **16**, there is provided a circumferential groove **50**. This groove is used to hold a circumferential chime **52** disposed around the body **12**. A similar groove **54** is used at the bottom of body **12** to hold a second chime **56**. Chimes **52**, **56** are used to reinforce and protect the body **12**. More particularly, these chimes **52**, **56** extend axially beyond closure **30** on top, or sump **32** on the bottom respectively, forming a disk shaped protected space. Chimes **52**, **56** may be made of plastic or a metallic material.

In addition, as mentioned above, bottom **18** is sloped. Chime **56** preferably has a uniform height and is mounted in such a manner as to insure that drum **10** stands upright. Without chime **56**, drum **10** would tilt to one side and could not be stacked. Top chime **52** maybe provided with several small holes (not shown) to allow excess liquid to drain off from the side of the drum. In addition, chime **52** maybe provided with several larger holes such as H. A chain or a rope maybe passed through these holes for lifting the drum **10**. Chime **52** is also rimmed as at R to permit handling of the drum with a mechanical means such as by parrot beaks, lift truck forks or drum buggies.

The drum is made by first, blow-molding the body **12** to form a unitary structure, and then applying the chimes **52**, **56** thereto. As mentioned before, pipe **40** may be inserted into the drum body either before shipping, or before dispensing of the liquid.

The drum described in the figure is filled through one of the access holes, such as access 24. Although the other access hole 26 may also be used, access hole 24 is preferable because it permits the liquid to flow in much faster, while if hole 26 is used, the liquid flow will be impeded somewhat by pipe 40. Once the drum is filled the closures are applied to seal the drum 10. The drum is stored or shipped as required. The liquid is dispensed, for example, by coupling drain pipe 40 to a suitable pump. Importantly, bottom is sloping toward sump 32 so that surface 34 of sump 32 is the lowest surface within the drum, and since the area of the sump 32 is relative small when compared to the total area of bottom 18, at the end, substantially all the liquid in the drum is collected in sump 32 and may be easily removed therefrom.

Obviously numerous modifications may be made to this invention without departing from its scope as defined in the appended claims.

What is claimed is:

1. A drum capable of being substantially fully drained and emptied of liquid contents, said drum comprising:
 - a) a unitary, blow molded plastic outer body including a side wall, a top, and a bottom, said top having an access hole radially offset from a central axis of said body, said bottom having a sump that is radially offset from said central axis and substantially vertically aligned with said access hole, said bottom being sloped toward said sump so that liquid will flow along the sloped bottom into said sump, said sump having a base disposed below the sloped bottom and defining a lowest surface of said body so that said sump will receive liquid that flows from the sloped bottom, said sump having a relatively small area compared to a total area of said bottom, whereby substantially all of the liquid in the drum will collect in said sump;
 - b) a lower chime disposed around said bottom and secured to said body in such a manner to have surfaces thereof below said sump so as to assure that the drum stands upright;
 - c) an upper chime disposed around said top and secured to said body and having portions to permit handling of the drum with a mechanical handling device; and
 - d) a drain pipe permanently installed in said body, said drain pipe having a top and a bottom and extending from said access hole to said sump, with the bottom of said pipe being received in said sump and disposed proximate the base of said sump and the top of said pipe being adapted to be coupled with a pump for substantially completely draining liquid from said sump and consequently substantially the whole contents of the drum by suction.
2. The drum of claim 1, wherein said access hole is disposed closer to a periphery of said top than to said central axis.
3. The drum of claim 1, wherein said drain pipe has an adjustable length.
4. The drum of claim 1, wherein said bottom further comprises a boss disposed on the base of said sump and received in the bottom of said drain pipe to maintain substantially vertical alignment of said drain pipe.
5. The drum of claim 1, wherein the bottom of said drain pipe has perforations or holes formed therein to admit liquid from said sump into said pipe.
6. The drum of claim 1, wherein the base of said sump includes a flat surface and said sump includes a conical section joined to said base.

7. The drum of claim 6, wherein said flat surface and said access hole are circular and a diameter of said flat surface is slightly larger than a diameter of said access hole.

8. The drum of claim 1, wherein said top further includes a second access hole radially offset from said central axis.

9. The drum of claim 1, wherein said upper chime includes a rim for lifting said drum.

10. The drum of claim 1, wherein said upper chime includes holes for lifting said drum.

11. The drum of claim 1, wherein said drain pipe has an adjustable length, said bottom further comprises a boss disposed on the base of said sump and received in the bottom of said drain pipe to maintain substantially vertical alignment of said drain pipe, the base of said sump includes a flat surface and said sump includes a conical section joined to said base, said flat surface and said access hole are circular and a diameter of said flat surface is slightly larger than a diameter of said access hole, said top further includes a second access hole radially offset from said central axis, and said upper chime includes one of a rim for lifting said drum and holes for lifting said drum.

12. A drum capable of being substantially fully drained and emptied of liquid contents, said drum comprising:

- a) a unitary, blow molded plastic outer body including a side wall, a top, and a bottom, said top having an access hole radially offset from a center of said top, said bottom having a sump that is radially offset from said center and substantially vertically aligned with said access hole, said bottom being configured to guide liquid into said sump, and said sump having a relatively small area compared to a total area of said bottom, whereby substantially all of the liquid in the drum will collect in said sump;
- b) a support member secured to said body in such a manner to have a portion disposed below said sump so as to assure that the drum stands upright; and
- c) a drain pipe permanently installed in said body, said drain pipe having a top and bottom and extending from said access hole into said sump, the top of said pipe being adapted to be coupled with a pump for substantially completely draining liquid from said sump and consequently substantially the whole contents of said drum by suction.

13. The drum of claim 12, wherein said access hole is disposed closer to a periphery of said top than to the center of said top.

14. The drum of claim 12, wherein said support member is a lower chime disposed around said bottom and secured to said body.

15. The drum of claim 12, wherein said drain pipe has an adjustable length.

16. The drum of claim 12, wherein said bottom further comprises a boss disposed on the base of said sump and received in the bottom of said drain pipe to maintain substantially vertical alignment of said drain pipe.

17. The drum of claim 12, wherein the bottom of said drain pipe is disposed proximate the base of said sump and has perforations or holes formed therein to admit liquid from said sump into said drain pipe.

18. The drum of claim 12, wherein the base of said sump includes a flat surface and the sump includes a conical section joined to said base.

19. The drum of claim 18, wherein said flat surface and access hole are circular and a diameter of said flat surface is slightly larger than a diameter of said access hole.

20. The drum of claim 12, wherein said top further includes a second access hole radially offset from the center of said top.

5

21. The drum of claim 12, further comprising an upper chime disposed around said top and secured to said body, said upper chime having a rim for lifting said drum.

22. The drum of claim 12, further comprising an upper chime disposed around said top and secured to said body, 5 said upper chime having holes for lifting said drum.

23. The drum of claim 12, wherein said drain pipe has an adjustable length, said bottom further comprises a boss disposed on the base of said sump and received in the bottom of said drain pipe to maintain substantially vertical alignment of said drain pipe, the base of said sump includes a flat surface and said sump includes a conical section joined to

6

said base, and said flat surface and said access hole are circular and a diameter of said flat surface is slightly larger than a diameter of said access hole.

24. The drum of claim 23, wherein said top further includes a second access hole radially offset from the center of said top, the drum further comprising an upper chime disposed around said top and secured to said body, said upper chime including one of a rim for lifting said drum and 10 holes for lifting said drum.

* * * * *